

Tripod Data Systems, Inc. **Raw Data Record Specification** **Survey Pro[™] Version 4.0**

June 3, 2004

Table of Changes

Change	Date	By
Fixed <ul style="list-style-type: none"> enum definitions for AO (Azimuth Orientation) and GO (Grid Orientation) fields (of CG record) enum definition for TP (Projection Type) field (of PJ/PE records) enum definition for CT (Origin Center) and AF (Azimuth Format) fields (of PE record) enum definition of DA (Datum Type) field (of DT record) 	November 15, 2002	GB
Fixed <ul style="list-style-type: none"> Offset length changed to Offset Angle Right in the OF Record 	Feb. 11, 2003	AH
Added <ul style="list-style-type: none"> Stake DTM with a centerline will output offset cut sheet data (starting with SP 3.8) 	August 26, 2003	KAM
Added <ul style="list-style-type: none"> Note in the BL record clarifying measure point for GPS baselines (APC). 	November 18, 2003	AH
Update for Survey Pro 4.0 <ul style="list-style-type: none"> Added - Leveling Records Added - Point Slope Staking Records 	May 12, 2004	GB
Additional SP4.0 Changes <ul style="list-style-type: none"> Added optional units field to the attribute (AT) record 	June 3, 2004	KAM

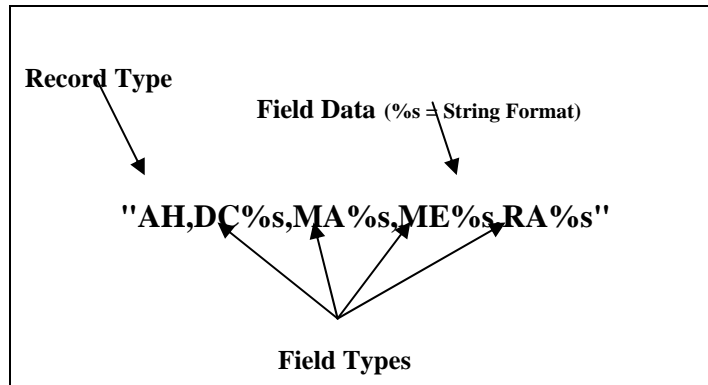
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Records and Fields

General Record Description:



Notes:

- Raw data records are comma delimited and in ASCII text format.
- In the Record Definitions, an (ENUM) after a field name means this field is an enumeration type field (i.e. 0 = blue, 1 = red, etc.). These fields are described in the Field Lists section.
- Field data types are also described in the Field Lists sections.
- Under the Description column in Field Lists, (See MO for units) refers to the actual "3. Mode Setup Record" of the corresponding raw file.

General Raw Data Records

1. -- - Note record
2. JB - Job Record
3. MO - Mode Setup Record

Conventional Raw Data Records

4. AP - Adjusted point record
5. AT - Attributes
6. BK - Backsight Record
7. CF - Cut Sheet Record
8. DE - Design point / location record
9. DL - Define a Location Record
10. DP - Deleted point record
11. FC - Feature Code
12. LS - Line of Sight Record
13. MD - Multiple Distances Record
14. OC - Occupy Point Record
15. OE - Offset delta record
16. OF - Off Center Shot Record
17. RB - Repeat Backsight
18. RD - Repeat Directional
19. RE - Remote Elevation Record
20. RF - Repeat Foresight
21. RS - Resection Record
22. SD - Deltas record
23. SK - Stake Out Record
24. SL - Slope Staking Record
25. SP - Store Point Record
26. SR - Slope Staking Reference Offset Record
27. SU - Sun Shot Record
28. TR/SS/OB - Traverse / Sideshot / Observation Record
29. PL - Point Slope Stake Record
30. PR - Point Slope Stake Offset Record

GPS Raw Data Records

31. AH - GPS Antenna Height
32. BL - GPS Base Line
33. BP - Set Base Receiver Position
34. CG - COGO settings record
35. CS - Coordinate System Identity
36. CT - Calibration Point
37. CV - RMS Covariance of GPS Base Line
38. DG - Datum Grid Record
39. DT - Datum Record
40. EE - GPS Edit Point Record
41. EP - Geodetic position

- 42. EQ - Equipment Record
- 43. ES - Ellipsoid Record
- 44. GK - GPS stakeout record
- 45. GO - GPS Offset Shot Record
- 46. GP - GPS Point Record
- 47. GR - GPS adjusted point record
- 48. GS - GPS Store Point
- 49. HA - Horizontal Calibration (Adjust)
- 50. PE - Extended Projection Record
- 51. PJ - Projection Record
- 52. RP - Local coordinates of calibration point
- 53. RX - Receiver Setup
- 54. ST - Local site settings
- 55. VA - Vertical Calibration (Adjust)

Leveling Records

- 56. LL –Level Open Loop Record
- 57. LB – Level Raw Observation Record
- 58. LF – Level Reduced Observation Record
- 59. LP – Level 2 Peg Test Results Record
- 60. LC – Level Close Loop Record

Legacy Raw Data Records

(Not used in Survey Pro 3.5 and beyond)

- 61. AA - Accumulating Angle-right (not used in SPCE)
- 62. BB - Bench level, backsight (not used in SPCE)
- 63. BG - Base Point Geoid Model Elevation (no longer supported in SPCE 3.5, replaced by VA record)
- 64. BS - Bench level, side shots (not used in SPCE)
- 65. BT - Bench level, traverse (not used in SPCE)
- 66. HC - Horizontal Control Point (not supported in SPro 3.5, replaced with CT)
- 67. LE - Vertical Ellipsoid Height Setup
- 68. LG - Vertical Geoid Model Setup (no longer supported in SPCE3.5)
- 69. LM - Horizontal Mapping Plane Setup (no longer supported in SPCE3.5)
- 70. LH - Local transforming coefficients for horizontal (no longer supported in SPCE3.5 and replaced by Horizontal adjustment record HA)
- 71. LV - Local transforming coefficients for vertical (no longer supported in SPCE3.5 and replaced by Vertical adjustment record VA)
- 72. VC - Vertical Control point (not supported in SPro 3.5, replaced with CT)

General Raw Data Record Definitions

1. -- - Note Record

2. JB - Job Record

Record type: JB

Field headers:

NM: Job name

DT: Date

TM: Time

“JB,NM%s,DT%s,TM%s”

3. MO - Mode Setup Record

The mode setup will be recorded at the beginning of the raw data file and whenever it is changed.

Record type: MO

Field headers:

AD: Azimuth direction (ENUM)

UN: Distance unit (ENUM)

SF: Scale factor

EC: Earth curvature (ENUM)

EO: EDM offset (inch) (Default string “0.0”)

AU: Angle unit (ENUM)

“MO,AD%s,UN%s,SF%s,EC%s,EO0.0,AU%s”

Conventional Raw Data Record Definitions

4. AP - Adjusted point record

Record type: AP

Field headers:

PN: Point name

N : Adjusted northing

E : Adjusted easting

EL: Adjusted elevation

--: Description

“AP,PN%s,N %s,E %s,EL%s,--%s”

5. AT – Attributes

Record type: AT

Field headers:

TN: Attribute name

TV: Attribute value in string form

TU: Attribute units in string form // optional

“AT,TN%s,TV%s”

“AT,TN%s,TV%s,TU%s”

6. BK - Backsight Record

Record type: BK

Field headers:

OP: Occupy point

BP: Back point

BS: Backsight

BC: Back circle

“BK,OP%s,BP%s,BS%s,BC%s”

7. CF - Cut Sheet Record

Record type: CF (cut or fill)

For an offset stakeout cut sheet

ST: Station

OD: Offset direction (ENUM)

OL: Offset length

EL: Elevation

GD: Grade (design)

“CF,ST%s,OD%s,OL%s,EL%s,GD%s”

For a point stakeout cut sheet

PN: Point number

EL: Elevation

GD: Grade

“CF,PN%s,EL%s,GD%s”

Note: From Survey Pro CE 3.5, the PN field and description field are removed from CF record for point stake out.

8. DE - Design point / location record

Record type: DE

Field headers:

PN: Point name (*design point, may be blank*)

N : Northing

E : Easting

EL: Elevation

--: Description (*design point description, may be blank*)

“DE,PN%s,N %s,E %s,EL%s,--%s”

9. DL - Define a Location Record

Record type: DL

Field headers:

PN: Point name (POB)

HD: Relative horizontal distance

VD: Relative vertical distance

AZ: Azimuth

--: Description of the stored point.

“DL,PN%s,HD%s,VD%s,AZ%s,--%s”

10. DP - Deleted point record

Record type: DP

Field headers:

PN: Point name

“DP,PN%s”

11. FC – Feature Code

Record type: FC

Field headers:

PN: Point name

FN: Feature code name (may be blank)

“FC,PN%s,FN%s”

12. LS - Line of Sight Record

Record type: LS

Field headers:

HI: Height of instrument

HR: Height of rod

“LS,HI%s,HR%s”

13. MD – Multiple Distance

Record type: MD

Field headers:

SD: Slope distance

“MD,SD %s:%s”

14. OC - Occupy Point Record

Record type: OC

Field headers:

OP: Point number

N : Northing (the header is N space)

E : Easting (the header is E space)

EL: Elevation

--: Description

“OC,OP%s,N %s,E %s,EL%s,--%s”

15. OE - Offset delta record

Record type: OE

Field headers:

ST: Station

OE: Offset delta (*actual offset – design offset*)

“OE,ST%s,OE%s”

16. OF - Off Center Shot Record

Record type: OF

Field headers:

AR: Angle right

ZE: Zenith

SD: Slope distance

OL: Offset-angle right

HD: Horizontal distance

VD: Vertical distance

LR: Left/Right Offset

“OF,AR%s,ZE%s,SD%s”

“OF,ZE%s,--Vert Angle Offset”

“OF,OL%s,--Right Angle Offset”

“OF,HD%s,--Horizontal Distance Offset”

“OF,LR%s,--Left / Right Offset”

“OF,VD%s,--Elevation Offset”

17. RB – Repeat Backsight

Record type: RB (repeat backsight)

Field headers:

OP: Occupied point

BP: Backsight point

AR: Angle right

ZE: Zenith angle

SD: Slope distance

HR: Height of rod at the backsight

--: Description

“RB,OP%s,BP%s,AR%s,ZE%s,SD%s,HR%s,--%s”

18. RD – Repeat Directional

Record type: RD

Field headers:

BD: Backsight direct

FD: Foresight direct

ZD: Zenith direct

FV: Foresight reverse

ZV: Zenith reverse

BV: Backsight reverse

“RD,FD %s:%s”

“RD,FV %s:%s”

“RD,BD %s:%s”

“RD,BV %s:%s”

“RD,ZD %s:%s”

“RD,ZV %s:%s”

//The data before the colon (:) is the integer set number and the data after the colon is the angle measurement. See MO record for angle units.

19. RE - Remote Elevation Record

Record type: RE

Field headers:

OP: Occupied point

FE: Foresight elevation

ZE: Zenith angle

SD: Slope distance

--: (always “Remote elev”)

“RE,OP%s,FE%s,ZE%s,SD%s,--%s”

20. RF – Repeat Foresight

Record type: RF (repeat foresight)

Field headers:

OP: Occupied point

FP: Foresight point

AR: Angle right

ZE: Zenith angle

SD: Slope distance

HR: Height of rod at the foresight

--: Description

“RF,OP%s,FP%s,AR%s,ZE%s,SD%s,HR%s,--%s”

21. RS - Resection Record

Record type: RS

Field headers:

PN: Point number

CR: Circular reading

ZE: Zenith (or VA, CE)

SD: Slope distance (or HD)

“RS,PN%s,CR%s,ZE%s,SD%s”

// A resection with angles and distance

“RS,PN%s,CR%s”

// A resection with angles only

22. SD - Deltas record

Record type: SD

Field headers:

ND: Delta northing

ED: Delta easting

LD: Delta elevation

“SD,ND%s,ED%s,LD%s”

23. SK - Stake Out Record

Record type: SK

Field headers:

OP: Occupy point

FP: Foresight point

AR: Angle right

ZE: Zenith

SD: Slope distance

“SK,OP%s,FP%s,AR%s,ZE%s,SD%s,--%s”

Note: FP field used to record design point name. Starting from SPCE3.5, it records the actual point name. It also may be blank if there is no actual point stored.

24. SL - Slope Staking Record

Record type: SL

Field headers:

ST: Station

OD: Offset direction (ENUM)

EL: Actual catch point elevation

GD: Grade (design elevation of the catch point based on the slope line)

AS: Ahead on station (positive when rod is beyond design station, negative when before station)

HH: Horizontal distance to hinge point (always positive)

VH: Vertical distance to hinge point (positive when rod is above hinge)

HC: Horizontal distance to center line (always positive)

VC: Vertical distance to center point (positive when rod is above center point)

CF: Slope used (ENUM)

DS: Design slope

OB: Observed slope

“SL,ST%s,OD%s,EL%s,GD%s,AS%s,HH%s,VH%s,HC%s,VC%s,CF%s,DS%s,OB%s”

25. SP - Store Point Record

Record type: SP

Field header:

PN: Point number

N: Northing

E: Easting

EL: Elevation

--: Description

“SP,PN%s,N %s,E %s,EL%s,--%s”

26. SR - Slope Staking Reference Offset Record

Record type: SR

Field headers:

ST: Station

OD: Offset direction (ENUM)

EL: Actual elevation

GD: Grade (design elevation, corresponds to the elevation of the found catch point)

AS: Ahead on station (positive when rod is beyond design station, negative when before station)

HH: Horizontal distance to hinge point (always positive). This distance includes the reference offset.

VH: Vertical distance to hinge point (positive when rod is above hinge)

HC: Horizontal distance to center line (always positive). This distance includes the reference offset.

VC: Vertical distance to center point (positive when rod is above center point)
 CF: Slope used (ENUM)
 DS: Design slope
 OB: Observed slope at the catch point
 OL: Offset length from the catch point

“SR,ST%s,OD%s,EL%s,GD%s,AS%s,HH%s,VH%s,HC%s,VC%s,CF%s,DS%s,OB%s,OL%s”

27. SU - Sun Shot Record

Record type: SU

//For a sun shot setup

GH: Greenwich hour angle (GHA 0)
 GH: Greenwich hour angle (GHA 24)
 DE: Declination (DECL 0)
 DE: Declination (DECL 24)
 SM: Semi-diameter of Sun (in DMS)
 DT: Local date (See General and Conventional Field List)
 TM: Local time (See General and Conventional Field List)

//For the actual sun shot

BD: Backsight direct
 FD: Foresight direct
 FV: Foresight reverse
 BV: Backsight reverse
 LA: Latitude
 LO: Longitude
 EG0: Left trailing edge sun position
 EG1: Right trailing edge sun position
 EG2: Center sun position

“SU,GH%s,GH%s,DE%s,DE%s,SM%s”

“SU,DT%02s%02s%04s”

“SU,LA%s,LO%s,EG%s”

“SU,TM%s”

“SU,%s%s%s” // Will write BD,BV or FD,FV with an angle measurement. See MO record for angle units.

28. TR/SS/OB - Traverse / Sideshot / Observation Record

Record type: TR / SS / OB

Field headers:

OP: Occupy point
 FP: Foresight point

(one of the following)

AZ: Azimuth
 AR: Angle right
 AL: Angle left

(one of the following pair)

ZE: Zenith

SD: Slope distance

(or)

CE: Change elevation

HD: Horizontal distance

--: Description

"TR,OP%s,FP%s,AR%s,ZE%s,SD%s,--%s"

"SS,OP%s,FP%s,AR%s,ZE%s,SD%s,--%s"

"OB,OP%s,FP%s,AR%s,ZE%s,SD%s,--%s"

29. PL – Point Slope Stake Record

Record type: PL

Field headers:

PN: Hinge point name

AZ: Slope direction

EL: Actual catch point elevation

GD: Grade (design elevation of the catch point based on the slope line)

AS: Ahead on slope direction (positive when rod is left of slope, negative when right)

HH: Horizontal distance to hinge point (always positive)

VH: Vertical distance to hinge point (positive when rod is above hinge)

CF: Slope used (0 for cut, 1 for fill)

DS: Design slope

OB: Observed slope

--: Note (catch point description)

"PL,PN%s,AZ%d,EL%s,GD%s,AS%s,HH%s,VH%s,CF%d,DS%s,OB%s"

30. PR – Point Slope Stake Reference Offset Record

Record type: PR

Field headers:

PN: Hinge point name

AZ: Slope direction

EL: Actual elevation

GD: Grade (design elevation, corresponds to the elevation of the found catch point)

AS: Ahead on slope direction (positive when rod is left of slope, negative when right)

HH: Horizontal distance (including reference offset) to hinge point (always positive).

VH: Vertical distance to hinge point (positive when rod is above hinge)

CF: Slope used (0 for cut, 1 for fill)

DS: Design slope

OB: Observed slope at the catch point

OL: Offset length from the catch point

-- : Note (catch point description)

"PR,PN%s,AZ%d,EL%s,GD%s,AS%s,HH%s,VH%s,CF%d,DS%s,OB%s,OL%s"

GPS Raw Data Record Definitions

31. AH - GPS Antenna Height

Record type: AH

Field headers:

DC: Derivation Code (ENUM)

MA: Measured antenna height

ME: Measure Method (ENUM)

RA: Reduced antenna height (to phase center)

“AH,DC%s,MA%s,ME%s,RA%s”

32. BL - GPS Base Line

Record type: BL

Field headers:

DC: Derivation

PN: Point Name

DX: Base line Delta X*

DY: Base line Delta Y*

DZ: Base line Delta Z*

-- : Description (Feature Code)

GM: GPS Measure Method (ENUM)

CL: Classification

HP: Horizontal Precision

VP: Vertical Precision

“BL,DC%s,PN%s,DX%s,DY%s,DZ%s,--%s,GM%s,CL%s,HP%s,VP%s”

(*) NOTE: The GPS baseline deltas are calculated between the antenna phase centers (APC) of the base and rover GPS receivers.

33. BP - Set Base Receiver Position

Record type: BP

Field headers:

PN : Point Name

LA: Latitude

LN: Longitude

HT: Ellipsoid Height

SG: Setup Group (default = 0)

“BP,PN%s,LA%s,LN%s,HT%s,SG%s”

34. CG – COGO Settings record

Record type: CG

Field headers:

AO: Azimuth Orientation (ENUM)

GO: Grid Orientation (ENUM)

“CG,AO%s,GO%s”

35. CS - Coordinate System Identity

Record type: CS

Field headers:

CO: Coordinate system option (ENUM)

ZG: Zone group (system) name

ZN: Zone name

DN: Datum name

“CS,CO%s,ZG%s,ZN%s,DN%s”

36. CT - Calibration Point

Record type: CT

Field headers:

PN: Point Name

DM: Dimensions used (ENUM)

RH: Horizontal residual

RV: Vertical residual

“CT,PN%s,DM%s,RH%s,RV%s”

37. CV - RMS Covariance of GPS Position

Record type: CV

Field headers:

DC: Derivation (ENUM)

SV: Minimum number of SV during observation

SC: Error Scale

XX: Variance X

XY: Covariance X,Y

XZ: Covariance X,Z

YY: Variance Y

YZ: Covariance Y,Z

ZZ: Variance Z

“CV,DC%s,SV%s,SC%s,XX%s,XY%s,XZ%s,YY%s,YZ%s,ZZ%s”

38. DG - Datum Grid Record

Record type: DG

Field headers:

FI: File name

“DG,FI%s”

39. DT - Datum Record

Record type: DT

Field headers:

DA: Type of datum (ENUM)

RD: Ellipsoid radius

IF: Ellipse inverse flattening

OX: Rotation x

OY: Rotation y

OZ: Rotation z

LX: Translation x

LY: Translation y

LZ: Translation z

SP: Scale factor in ppm

“DT,DA%s,RD%s,IF%s,OX%s,OY%s,OZ%s,LX%s,LY%s,LZ%s,SP%s”

40. EE - GPS Edit Point Record

Record type: EE

Field headers:

GF: Geodetic Flags (ENUM)

SG: Setup Group

“EE,GF%s,SG%s”

41. EP - Geodetic position

Record type: EP

Field headers:

TM: Time

LA: Latitude

LN: Longitude

HT: Ellipsoid Height

RH: Horizontal RMS returned from receiver

RV: Vertical RMS returned from receiver

DH: HDOP if receiver returns this info

DV: VDOP if receiver returns this info

GM: GPS Method (ENUM)

CL: Classification (ENUM)

“EP,TM%s:%s:%s,LA%s,LN%s,HT%s,RH%s,RV%s,DH%s,DV%s,GM%s,CL%s”

42. EQ - Equipment Record

Record type: EQ

Field headers:

DC: Derivation Code (ENUM)

RX: Rx Type

RS: Rx Serial Number

AN: Antenna Number (from Antenna.ini)

AI: Antenna Index (measure to index from antenna.ini)

AT: Antenna Type (name of antenna)

TS: Antenna Serial Number

TA: Tape Adjustment

HO: Horizontal Offset

VO: Vertical Offset

“EQ,DC%s,RX%s,RS%s,AN%s,AI%s,AT%s,TS%s,TA%s,HO%s,VO%s”

43. ES - Ellipsoid Record

Record type: ES

Field headers:

RD : a - radius of semi major

IF: 1/f - inverse flattening

EM: Name - ellipse name

“ES,RD%s,IF%s,EM%s”

44. GK - GPS stakeout record

Record type: GK

Field headers:

PN: Point name (*actual point, may be blank*)

N : Northing

E : Easting

EL: Elevation

--: Description (*actual point description, may be blank*)

“GK,PN%s,N %s,E %s,EL%s,--%s”

45. GO - GPS Offset Shot Record

Record type: GO

Field headers:

PN: Point Name

AZ: Azimuth

ZE: Zenith Angle

SD: Slope Distance

HI: Height of laser at GPS reference point

HR: Height of laser target at store offset point

--: Description

“GO,PN%s,AZ%s,ZE%s,SD%s,HI%s,HR%s,--%s”

46. GP - GPS Point Record

Record type: GP

Field headers:

PN: Point Name

PT: Point Type (ENUM)

“GP,PN%s,PT%s”

47. GR – GPS adjusted point record

Record type: GR

Field headers:

N : Northing

E : Easting

EL: Elevation

-- : Description

“GR,PN%s,N %s,E %s,EL%s,--%s”

48. GS - GPS Store Point

(The GS record is similar to the SP record, which records the coordinate of a point. This record identifies the point is created by GPS.)

Record type: GS

Field headers:

PN: Point Name

N : Local Northing

E : Local Easting

EL: Local Elevation

-- : Description

“GS,PN%s,N%s,E%s,EL%s,--%s”

49. HA - Horizontal Calibration (Adjust)

Record type: HA

Field headers:

N : Origin north

E : Origin east

TH: Translation north

TE: Translation east

RT: Rotation about origin

SF: Scale factor at origin

“HA,N %s,E %s,TH%s,TE%s,RT%s,SC%s”

Note: all the fields may be blank if there is no adjustment done.

50. PE - Extended Projection Record

Record type: PE

Field headers:

TP: Type of projection (ENUM)

LA: Latitude of origin

LN: Longitude of origin

HT: Height of origin

N : Origin north

E : Origin east

EL: Origin elevation

SC: Scale factor

OO: Orientation one

OT: Orientation two

CT: Origin center (ENUM)

AF: Azimuth format (ENUM)

RY: Rectify

AE: Area (ENUM)

FO: File name one

FT: File name two

“PE,TP%s,LA%s,LN%s,HT%s,N %s,E %s,EL%s,SC%s,OO%s,OT%s, CT%s,
AF%s,RY%s,AE%s,FO%s,FT%s”

51. PJ - Projection Record

Record type: PJ

Field headers:

TP: Type of projection (ENUM)

LA: Latitude of origin

LN: Longitude of origin

HT: Height of origin

N : Origin north

E : Origin east

EL: Origin elevation

SC: Scale factor

OO: Orientation one

OT: Orientation two

“PJ,TP%s,LA%s,LN%s,HT%s,N %s,E %s,EL%s,SC%s,OO%s,OT%s”

52. RP – Local coordinates of calibration point

Record type: RP

Field headers:

N : Northing

E : Easting

EL: Elevation

-- : Description

“RP,PN%s,N %s,E %s,EL%s,--%s”

53. RX - Receiver Setup

Record type: RX

Field headers:

DC: Derivation Code (ENUM)

RA: Reduced antenna height (to phase centre)

RE: Recording interval in seconds

FI: Name of post processing file opened

“RX,DC%s,RA%s,RE%s,FI%s”

54. ST - Local site settings

Record type: ST

Field headers:

LA: Latitude

LN: Longitude

HT: Height

SC: Scale factor

N : Northing offset

E : Easting offset

“ST,LA%s,LN%s,HT%s,SC%s,N %s,E %s”

55. VA - Vertical Calibration (Adjust)

Record type: VA

Field headers:

PV: Type of vertical adjustment (ENUM)

N : Origin north (*may be blank*)

E : Origin east (*may be blank*)

LZ: Constant adjustment – translation Z (*may be blank*)

SO: Slope north (*may be blank*)

SA: Slope east (*may be blank*)

GN: Geoid Model Name

“VA,PV%s,N %s,E %s,LZ%s,SO%s,SA%s,GN%s”

Leveling Raw Data Record Definitions

56. LL –Level Open Loop Record

Record type: LL

Field headers:

NA: Loop Name

PN: Control Benchmark (CBM) point name for initial BS

EL: Elevation of initial BM

DT: Start date

TM: Start time

--: Description of the loop

“LL,NA%s,PN%s,EL%s,DT%s,TM%s,-- %s”

57. LB – Level Raw Observation Record (backsight or foresight)

Record type: LB

Field headers:

NA: Loop Name

BF: 0 for backsight, 1 for foresight

LM: Level Method (ENUM),

[...] for LM = three wire

UW: Upper wire reading

CW: Centre wire reading

LW: Lower wire reading

BE: Stadia Constant

[...] for LM = single wire

CW: Centre wire reading

[...] for LM = electronic

VD: Backsight rod reading

HD: Horizontal distance from level to BS or FS

[...] for LM = trig

ZE: Zenith Direct to BS or FS

SD: Slope Distance direct to BS or FS

ZE: Zenith Reverse to BS or FS

SD: Slope Distance Reverse to BS or FS

// Note: when the Survey Pro setting Do Not Shoot Reverse Distances is true, SD Reverse will not be present, and the distance for this shot will be the direct face distance.

58. LF – Level Reduced Observation Record (backsight or foresight)

Record type: LF

Field headers:

NA: Loop Name

BF: 0 for backsight, 1 for foresight

PN: Point name of FS.*

FY: Backsight / Foresight Type: (ENUM)

--: Description to this LF record // optional

* Note: Only BS or FS points of that are not type 'turning point' will have a name in this field. Observations to turning points will not have a name.

59. LP – Level 2 Peg Test Results Record

Record type: LP

Field headers:

A1: First reading of point A while instrument is half way between point A and B

B1: First reading of point B while instrument is half way between point A and B

A2: Second reading of point A while instrument is almost touching rod at point A

B2: Second reading of point B while instrument is almost touching rod at point A

HD: Horizontal distance between point A and B

ER: Computed Error as a ratio: $((A2-B2) - (A1-B1)) / (HD)$

DT: date

TM: time

--: Description // optional

60. LC – Level Close Loop Record

Record type: LC

Field headers:

NA: Loop Name

PN: Point name of closure CBM point

DT: End date

TM: End time

--: Description // optional

Legacy Raw Data Record Definitions

These records are not used in Survey Pro version 3.5 and beyond.

61. AA – Accumulating Angle-right

Record type: AA

Field headers:

BC: Back circle

AR: Angle right

ZE: Zenith

SD: Slope distance

“AA,BC%s,AR%s,ZE%s,SD%s”

62. BB - Bench level, backsight

Record type: BB

Field headers:

PN: Backsight point

EL: BS elevation

ZE: Zenith

SD: Slope distance

-- : Description

“BB,PN%s,EL%s,ZE%s,SD%s,--%s”

63. BG - Base Point Geoid Model Elevation

(Replaced by Vertical adjustment record VA)

Record type: BG

Field headers:

PN: Point Name

HT: Ellipsoid Height

GU: Geoid Undulation at base

EL: Elevation of base

“BG,PN%s,HT%s,GU%s,EL%s”

64. BS - Bench level, side shots

Record type: BS

Field headers:

PN: FS point

ZE: Zenith

SD: Slope distance

-- : Description

“BS,PN%s,ZE%s,SD%s,--%s”

65. BT - Bench level, traverse

Record type: BT

Field headers:

PN: FS point

ZE: Zenith

SD: Slope distance

-- : Description

“BT,PN%s,ZE%s,SD%s,--%s”

66. HC - Horizontal Control Point

(When solving local transformation, each control point’s lat, long and height will be recorded.)

Record type: HC

Field headers:

PN: Point Name

LA: Latitude

LN: Longitude

HT: Ellipsoid Height

-- : Description

“HC,PN%s,LA%s,LN%s,HT%s,--%s”

67. LE - Vertical Ellipsoid Height Setup

(Replaced by the vertical adjust record VA)

Record type: LE

Field headers:

--: Description string

“LE,--%s”

68. LG - Vertical Geoid Model Setup

(Replaced by the vertical adjust record VA)

Record type: LG

Field headers:

GI: Geoid model index

“LG,GI%s”

69. LM - Horizontal Mapping Plane Setup
(Replaced by the projection records (ES,PJ,DT,CS))

Record type: LM

Field headers:

ME: Method

CS: Coordinate System

DA: Datum

ZO: Zone

HE: Hemisphere

FI: Custom file name (cs5 or pj5)

“LM,ME%s,CS%s,DA%s,ZO%s,HE%s,FI%s”

70. LH - Local transforming coefficients for horizontal
(Replaced by Horizontal adjustment record HA)

Record type: LH

Field headers:

PN: Point Name

Ha: Coefficient a

Hb: Coefficient b

Hc: Coefficient c

Hd: Coefficient d

SC: Scale

RT: Rotation

“LH,PN%s,Ha%s,Hb%s,Hc%s,Hd%s,SC%s,RT%s”

71. LV - Local transforming coefficients for vertical
(Replaced by Vertical adjustment record VA)

Record type: LV

Field headers:

PN: Point Name

Va: Coefficient a

Vb: Coefficient b

Vc: Coefficient c

Ba: Base Latitude

Bo: Base Longitude

Bh: Base Ellipsoid Height

“LV,PN%s,Va%s,Vb%s,Vc%s,Ba%s,Bo%s,Bh%s”

72. VC - Vertical Control point

(When solving local transformation, each control point's lat, long and height will be recorded.)

Record type: VC

Field headers:

PN: Control point number

LA: Latitude of control point

LN: Longitude of control point

HT: Ellipsoid height of control point

--: Description

“VC,PN%s,LA%s,LN%s,HT%s,--%s”

General and Conventional Field List

Field	Type	Description
--: Note	string	Character string
AD: Azimuth Direction	enum	(See Enumerated Fields List Below)
AL: Angle Left	double	Angle (See MO for units)
AR: Angle Right	double	Angle (See MO for units)
AS: Ahead on station	double	Linear Distance (See MO for units)
AU: Angle Unit	enum	(See Enumerated Fields List Below)
AZ: Azimuth	double	Geodetic Angle (See MO for units)
BC: Back Circle	double	Angle (See MO for units)
BD: Backsight direct	string	2 char string "BD"
BP: Back point	string	Character string
BS: Backsight	double	Linear Distance (See MO for units)
BV: Backsight reverse	string	2 char string "BV"
CE: Change elevation	double	Linear Height (See MO for units)
CF: Slope used	boolean	(See Enumerated Fields List Below)
CR: Circular Reading	double	Angle (See MO for units)
DE: Declination	double	Geodetic Angle (See MO for units)
DS: Design Slope	double	Linear Distance (See MO for units)
DT: Date (JB Record)	string	Character string
DT: Date (SU Record)	int (8)	MMDDYYYY
E: Adj. Easting	double	Linear Distance (See MO for units)
EC: Earth Curvature	enum	(See Enumerated Fields List Below)
ED: Delta easting	double	Linear Distance (See MO for units)
EG: Sun Position	string	(See Enumerated Fields List Below)
EL: Elevation or Adj. Elevation	double	Orthometric Height (See MO for units)
EO: EDM offset	double	EDM offset (See MO for units)
FD: Foresight direct	string	2 char string "FD"
FE: Foresight elevation	double	Orthometric Height (See MO for units)
FN: Feature code name	string	Character string
FP: Foresight point	string	Character string
FV: Foresight reverse	string	2 char string "FV"
GD: Grade	double	Unit less Slope
GH: Greenwich hour angle	double	Geodetic Angle (See MO for units)
HC: Horizontal dist. to center line	double	Linear Distance (See MO for units)
HD: Horizontal distance	double	Linear Distance (See MO for units)
HD: Horizontal or relative horizontal dist.	double	Linear Distance (See MO for units)
HH: Horizontal distance to hinge point	double	Linear Distance (See MO for units)
HI: Height of Instrument	double	Linear Height (See MO for units)
HR: Height of Rod	double	Linear Height (See MO for units)
LA: Latitude	double	Geodetic Angle (DMS)
LD: Delta elevation	double	Linear Distance (See MO for units)
LO: Longitude	double	Geodetic Angle (DMS)
LR: Left/Right Offset	double	Linear Distance (See MO for units)
N: Adj. Northing	double	Linear Distance (See MO for units)
ND: Delta northing	double	Linear Distance (See MO for units)

NM: Job Name	string	Character string
OB: Observed slope	double	Linear Distance (See MO for units)
OD: Offset Direction	int	(See Enumerated Fields List Below)
OE: Offset Delta	double	Linear Distance (See MO for units)
OL: Offset length	double	Linear Distance (See MO for units)
OP: Occupy point	string	Character string
PN: Point name	string	Character string
SD: Slope Distance	double	Linear Distance (See MO for units)
SF: Scale Factor	double	Unit less Number
SM: Semi-diameter of Sun (in DMS)	double	Angle in Degrees Minutes Seconds
ST: Station	double	Linear Distance (See MO for units)
TM: Time (JB and EP Record)	string	HH:MM:SS in system time
TM: Time (SU – Record)	double	HH.ddddddd in UTC Time
TN: Attribute name	double	Linear Distance (See MO for units)
TV: Attribute value in string form	double	Linear Distance (See MO for units)
UN: Distance Unit	enum	(See Enumerated Fields List Below)
VC: Vertical distance to center point	double	Linear Distance (See MO for units)
VD: Vertical or relative vertical distance	double	Angle (See MO for units)
VH: Vertical distance to hinge point	double	Angle (See MO for units)
ZD: Zenith Direct	double	Angle (See MO for units)
ZE: Zenith or Zenith angle	double	Angle (See MO for units)
ZV: Zenith Reverse	double	Angle (See MO for units)

General and Conventional Enumerated Fields List

Field	Type	0	1	2
AD: Azimuth direction	enum	North	South	
AU: Angle Unit	enum	degree	grads	
CF: Slope used	bool	cut	fill	
EC: Earth Curvature	enum	off	on	
OD: Offset direction	int	Center	Right	Left
UN: Distance unit	enum	Feet	Meter	US Survey Feet
EG: Sun Position*	string	Left Trailing edge	Right Trailing Edge	center

*Note: Enumerated as 1 char string "0","1","2"

Leveling Field List

Field	Type	Description
A1: First 2 Peg reading from A	double	Linear Distance (units from MO record)
A2: Second 2 Peg reading from A	double	Linear Distance (units from MO record)
B1: First 2 Peg reading from B	double	Linear Distance (units from MO record)
B2: Second 2 Peg reading from B	double	Linear Distance (units from MO record)
BE: Stadia constant	int	Constant multiplier – unit less
BF: Level backsight or foresight	enum	(See Enumerated Fields List Below)
CW: Center stadia wire reading	double	Linear Distance (units from MO record)
DT: Date	date	Character string
ER: 2 Peg test collimation error	double	Ration (unit less)
HD: Horizontal distance	double	Linear Distance (units from MO record)
LM: Level Method	enum	(See Enumerated Fields List Below)
LW: Lower stadia wire reading	double	Linear Distance (units from MO record)
NA: Level Loop Name	string	Character string
SD: Slope Distance	double	Linear Distance (units from MO record)
TM: Time	Time	HH:MM:SS in system time
UW: Upper stadia wire reading	double	Linear Distance (units from MO record)
VD: Vertical or relative vertical distance	double	Angle (units from MO record)
ZE: Zenith or Zenith angle	double	Angle (units from MO record)
--: Description	string	Character string

Leveling Enumerated Fields List

BF: Backsight Foresight Flag enum

- 0 = Backsight observation
- 1 = Foresight observation

LM: Level Method enum

- 0 = three wire
- 1 = single wire
- 2 = electronic,
- 3 = Trig sequence (BS>BS)n - (FS>FS)n,
- 4 = Trig Sequence (BS,FS>FS,BS)n

GPS Field List

Field	Type	Description
-- : Description (Feature Code)	string	Character string
AE: Location Indicator	enum	(See Enumerated Fields List Below)
AF: Azimuth format	enum	(See Enumerated Fields List Below)
AI: Antenna Index	int	(See Antenna.ini File)
AN: Antenna Number	int	(See Antenna.ini File)
AO: Azimuth Orientation	WORD	(See Enumerated Fields List Below)
AT: Antenna Type (name of antenna)	string	Character string
AZ: Azimuth	double	Geodetic Angle(See MO for units)

Raw Data Record Specification

CL: Classification	enum	(See Enumerated Fields List Below)
CO: Coordinate System Option	WORD	(See Enumerated Fields List Below)
CT: Origin center	enum	(See Enumerated Fields List Below)
DA: Datum Transformation Type	WORD	(See Enumerated Fields List Below)
DC: Derivation Code	enum	(See Enumerated Fields List Below)
DH: HDOP from Rx	double	Horizontal Dilution of Precision (Unit less)
DM: Dimensions Used	WORD	(See Enumerated Fields List Below)
DN: Datum name	string	Character string
DV: VDOP from Rx	double	Vertical Dilution of Precision (Unit less)
DX: Base line Delta X	double	Linear Distance (See MO for units)
DY: Base line Delta Y	double	Linear Distance (See MO for units)
DZ: Base line Delta Z	double	Linear Distance (See MO for units)
E: Easting	double	Linear Grid Distance (See MO for units)
EL: Elevation	double	Orthometric Height (See MO for units)
EM: Ellipse Name	string	Character string
FI: File name	string	Character string
FO: File name one	string	Character string
FT: File name two	string	Character string
GF: Geodetic Flags	bit flags	(See Enumerated Fields List Below)
GM: GPS Measure Method	enum	(See Enumerated Fields List Below)
GN: Geoid Model Name	string	Character string
GO: Grid Orientation	WORD	(See Enumerated Fields List Below)
HI: Height of laser at GPS ref. Point	double	Linear Height (See MO for units)
HO: Horizontal Offset	double	Linear Distance (See MO for units)
HP: Horizontal Precision	double	Linear Distance (See MO for units)
HR: Height of laser target at store offset Pt.	double	Linear Height (See MO for units)
HT: Height or Ellipsoid Ht.	double	Linear Height (See MO for units)
IF: Ellipse inverse flattening	double	Ellipsoid Parameter (Unit less)
LA: Latitude	double	Geodetic Angle (DMS)
LN: Longitude	double	Geodetic Angle (DMS)
LX: Translation x	double	Linear Distance (See MO for units)
LY: Translation y	double	Linear Distance (See MO for units)
LZ: Translation z	double	Linear Distance (See MO for units)
MA: Measured antenna height	double	Linear Height (See MO for units)
ME: Measure Method	enum	(See Enumerated Fields List Below)
N: Northing	double	Linear Grid Distance (See MO for units)
OO: Orientation one	double	Latitude (DMS) or Angle (See MO for units)**
OT: Orientation two	double	Latitude (DMS)
OX: Rotation x	double	Angle (See MO for units)
OY: Rotation y	double	Angle (See MO for units)
OZ: Rotation z	double	Angle (See MO for units)
PN: Point Name	string	Character string
PT: GPS Point Type	enum	(See Enumerated Fields List Below)
PV: Type of Vertical Adjustment	WORD	(See Enumerated Fields List Below)
RA: Reduced antenna height	double	Linear Height (See MO for units)
RD: Ellipsoid Radius	double	Ellipsoid Semi-Major Axis (See MO for units)
RE: Recording interval (secs.)	int	GPS Data Logging Rate (seconds)

RH: Horizontal RMS from Rx	double	Linear Distance (See MO for units)
RS: Rx Serial Number	string	Character string
RT: Rotation about origin	double	Angle (See MO for units)
RV: Vertical RMS from Rx	double	Linear Height (See MO for units)
RX: Rx Type	string	Character string
RY: Rectify	boolean	False - No / True - Yes
SA: Slope east	string	Scale in parts per million (Unit less)
SC: Error Scale or Scale Factor	double	Scale (Unit less)
SD: Slope Distance	double	Linear Distance (See MO for units)
SF: Scale factor at origin	double	Scale (Unit less)
SG: Setup Group	int	Unique integer identifier
SO: Slope north	string	Scale in parts per million (Unit less)
SP: Scale factor in ppm	double	Scale in parts per million (Unit less)
SV: Min. # of SV during obs.	int	Integer Number of Satellites (Unit less)
TA: Tape Adjustment	double	Linear Distance (See MO for units)
TE: Translation East	double	Linear Distance (See MO for units)
TH: Translation North	double	Linear Distance (See MO for units)
TM: System Time	string	HH:MM:SS
TP: Type of projection	WORD	(See Enumerated Fields List Below)
TS: Antenna Serial Number	string	Character string
VO: Vertical Offset	double	Linear Height (See MO for units)
VP: Vertical Precision	double	Linear Height (See MO for units)
XX: Variance X	double	for GPS position (m ²)
XY: Covariance X,Y	double	for GPS position (m ²)
XZ: Covariance X,Z	double	for GPS position (m ²)
YY: Variance Y	double	for GPS position (m ²)
YZ: Covariance Y,Z	double	for GPS position (m ²)
ZE: Zenith Angle	double	Angle (See MO for units)
ZG: Zone Group (system) name	string	Character string
ZN: Zone name	string	Character string
ZZ: Variance Z	double	for GPS position (m ²)

****Depends on Projection Type Used**

GPS Enumerated Fields List

AE: Location indicator for Denmark projections enum

- 1 = None
- 2 = Zealand
- 3 = Jutland
- 4 = Bornholm

AF: Azimuth Format enum

- 0 = Geodetic
- 1 = Grid

AO: Azimuth Orientation WORD

- 1 = North
- 2 = South

CL: Classification enum

- 0 = Unknown Class
- 1 = Normal
- 2 = Control
- 3 = As Built
- 4 = Check
- 5 = BackSight
- 6 = Deleted Normal
- 7 = Deleted Control
- 8 = Deleted As Built
- 9 = Deleted Check
- 10 = Deleted BackSight

CO: Coordinate System Option WORD

- 1 = None
- 2 = Scale only
- 3 = Keyed in
- 4 = Chosen from library

CT: Origin Center enum

- 0 = Equator
- 1 = Projection center

DA: Datum Transformation Type WORD

- 513 = csdMolodenskyDatum
- 514 = csdMultipleRegressionDatum
- 515 = csdSevenParameterDatum
- 516 = csdGridDatum
- 517 = csdWGS84Datum

DC: Derivation Code enum

- 1 = ModeBase (Base)
- 2 = ModeRover (Rover)
- 3 = ModeGetBase (GetBase)
- 4 = ModeStatic (Static)

DM: Number of Dimensions Used for a Calibration WORD

- 1 = 0D (None)
- 2 = 1D (Vertical only)
- 3 = 2D (Horizontal only)
- 4 = 3D (Both vertical and horizontal)
- 5 = Any

GF: Geodetic Flags Bit Flags

- Bit 0 = GPS Base Point
- Bit 1 = GPS Horizontal Control Point
- Bit 2 = GPS Vertical Control Point
- Bit 3 = GPS Control Point
- Bit 4 = Local Map Plane Origin (Legacy, not used in Survey Pro 3.5 and beyond)
- Bit 5 = GPS Base Coordinate Invalid

GM: GPS Measure Method **enum**

- 0 = UnknownMethod
- 1 = UserInput
- 2 = Autonomous
- 3 = RTKFloat
- 4 = RTKFixed
- 5 = CopiedPoint
- 6 = RTCMCode
- 7 = WASS

GO: Grid Orientation **WORD**

- 1 = NE
- 2 = SW
- 3 = NW
- 4 = SE

ME: MeasureMethod **enum**

- 0 = Unknown
- 1 = True
- 2 = Uncorrected

PT: GPS Point Type **enum**

- 1 = Control
- 2 = Check
- 3 = DataCollect
- 4 = Offset
- 5 = RemoteElevation
- 6 = PostProcess
- 7 = UserInput

PV: Type of Vertical Adj. **WORD**

- 1 = inclined plane
- 2 = geoid model
- 3 = combined

TP: Type of Projection **WORD**

- 2049 = Albers Equal Area Conic
- 2050 = Cassini
- 2051 = Krovak
- 2052 = Lambert Conformal Conic One Parallel
- 2053 = Mercator
- 2054 = New Zealand Map Grid
- 2055 = Oblique Conformal Conic
- 2056 = Oblique Mercator Azimuth
- 2057 = Oblique Stereographic
- 2058 = Plane
- 2059 = Stereographic
- 2060 = RD Stereographic
- 2062 = Transverse Mercator
- 2063 = United Kingdom National Grid
- 2064 = Denmark
- 2065 = Hungarian EOV
- 2066 = Lambert Conformal Conic Two Parallel
- 2067 = Oblique Mercator Two Points

- 2068 = Double Stereographic
- 2069 = Grid

Legacy Field List

Field	Type	Desc.
-- : Description (Feature Code)	string	Character string
AR: Angle right	double	Angle (See MO for units)
Ba: Base Latitude	double	Base Station Latitude (DMS)
BC: Back circle	double	Angle (See MO for units)
Bh: Base Ellipsoid Height	double	Base Station Height (See MO for units)
Bo: Base Longitude	double	Base Station Longitude(DMS)
CS: Coordinate System	int	Index into TDS Geodetic dll
DA: Datum	int	Index into TDS Geodetic dll
EL: Elevation	double	Orthometric Height (See MO for units)
FI: File Name	string	Character string
GI: Geoid model index	int	Index into TDS Geodetic dll
GU: Geoid Undulation at base	double	Undulation Value (See MO for Units)
Ha: Coefficient a	double	Unit less coefficient
Hb: Coefficient b	double	Unit less coefficient
Hc: Coefficient c	double	Distance Coefficient (See MO for units)
Hd: Coefficient d	double	Distance Coefficient (See MO for units)
HE: Hemisphere	int	Index into TDS Geodetic dll
HT: Height	double	Linear Height (See MO for units)
LA: Latitude	double	Geodetic Angle (DMS)
LN: Longitude	double	Geodetic Angle (DMS)
ME: Method	int	Index into TDS Geodetic dll
PN: Backsight point	string	Character string
RT: Rotation	double	Angle (See MO for units)
SC: Scale	double	Unit less Number
SD: Slope Distance	double	Linear Distance (See MO for units)
Va: Coefficient a	double	Unit less coefficient
Vb: Coefficient b	double	Unit less coefficient
Vc: Coefficient c	double	Distance Coefficient (See MO for units)
ZE: Zenith	double	Angle (See MO for units)
ZO: Zone	int	Index into TDS Geodetic dll